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CONVAIR | ASTRONAUTICS

CONVAIR DIVISION OF GENERAL DYNAMICS CORPORATION

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~~ASTRONAUTICS~~
TEST PROCEDURE
"E" SERIES R & D
PROPULSION POST-FIRING
SECURING OPERATIONS

ATP-M-0046

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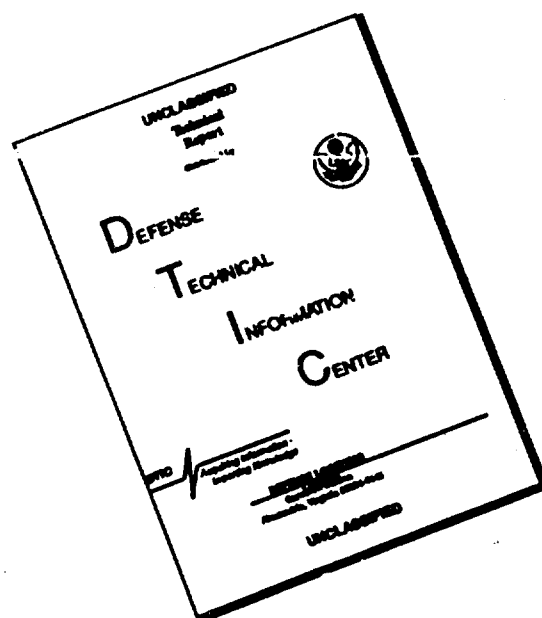
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I. INTRODUCTION**A. Purpose**

→ The purpose of this procedure is to provide a method for securing the Propulsion system after the formal, static firing countdown has been performed. () ←

B. Scope

The applicable parts of this procedure will be performed after the formal, static firing countdown, whether or not the run was aborted.

II. REFERENCES

1. Rocketdyne Manual R-1568P-1
2. ZM-7-618 (Abbreviations)
3. Rocketdyne Manual R-1631-1, and R-1338
4. ATP-P-0004
5. ATP-P-0036
6. ATP-P-0037
7. ATP-P-0051
8. T.O. 35E22-2-5-2

III. REQUIREMENTS**A. Personnel**

1. Test Stand Engineer
2. Test Engineer-Control Center
3. Stand Talker
4. Inspector (1)
5. Missile Mechanics (2)
6. Console Operator-Control Center
7. Data Reduction Representative
8. Firemen-Test Stand

III. (Continued)

B. Equipment

1. Rocket Engine Lubricating Purging Service Unit, Rocketdyne P/N G2000.
2. Residual Fuel Drain Installation 27-24508
3. Booster LO₂ regulator test plate.

IV. PREPARATIONS

INSP.

- A. Make certain that the formal, static firing countdown procedure has been completed. Do not perform the following procedure until approximately ONE HOUR after engine shut down.

V. PROCEDURE

A. Securing Operations

1. Check that the engine ground power is turned off and disconnect the electrical cables running to all gas generator igniters, turbine spinner initiators and turbine spinner heaters. Install protective covers on each cable connector.
2. Inspect the booster and sustainer engine areas for fuel and/or LO₂ leakage.
3. Remove the booster and sustainer engine turbine spinners and all gas generator igniters. Install protective plugs or closures on all exposed openings. Refer to ATP-P-0004 & ATP-P-0037 for removal procedure.
4. After the LO₂ boiloff is complete, secure the booster LO₂ seal purge.
5. Remove the expended hypergolic igniter cartridges from all five engines. Install protective plugs or closures on all exposed openings. (Reference ATP-0036 for removal procedure).
6. Purge the booster and sustainer igniter-fuel lines for 3 minutes using local control.
7. Apply vernier LO₂ purge and vernier fuel purge using local control. The purges shall remain on until gas emerging from the thrust chamber appears dry (approx. 3 minutes)

V. (Continued)

INSP.

8. Attach overboard residual fuel drain hoses with Wiggins socket fittings to the booster #1 & #2 propellant valves. As soon as fuel flow stops, disconnect drain hoses immediately.
9. Attach overboard residual fuel drain hoses with Wiggins socket fittings to the booster #1 & #2 propellant valves. As soon as fuel flow stops, disconnect drain hoses immediately.
10. Attach overboard residual fuel drain hose to the vernier fuel supply manifold on the missile fuel tank. Disconnect the drain hose immediately when fuel flow stops.
11. Secure residual fuel drain hoses.

B. Flushing and Purging Thrust Chambers

1. Inspect the booster and sustainer thrust chamber jackets for leakage. After all leakage has been noted, remove the four drain screws in each thrust chamber assembly and allow the residual fuel to drain.
2. Disconnect the booster igniter fuel and GG fuel bootstrap lines and the sustainer igniter fuel line, fuel manifold pressure sensing line, and the H.S. servo oxidizer sensing line at the thrust chambers. Pressure cap all ports and lines.
3. Prepare engine service unit, P/N G 6200 for operation.

NOTE

IN STEPS 4 & 30, PROPER PRECAUTIONS MUST BE FOLLOWED IN REMOVAL & REPLACEMENT OF THE LO₂ REGULATOR: i.e., PACKAGE TO PREVENT CONTAMINATION UPON REMOVAL AND RE-INSTALLATION PER APPLICABLE ROCKETDYNE DRAWINGS.

4. Remove B-1 LO₂ flow regulator and install test plate.
5. Reinstall the four drain screws in B-1 thrust chamber assembly, after residual fuel has drained.
6. Disconnect B-1 oxidizer dome missile purge system at the customer connect point and connect service unit hose -1- to the engine oxidizer dome flush-purge port.

V. (Continued)

INSP.

7. Connect service unit hose -2- to the fuel jacket flush purge port on B-1 main fuel valve. Check that the solvent tank pressure bleed valve is closed.
8. Turn LO₂ dome purge on reel -1-.
9. Turn solvent tank pressurization valve to on.
10. Open solvent flow reel -2- valve.
11. Open low pressure loader slowly until solvent begins flowing into fuel jacket.

CAUTION

THE SOLVENT SHOULD NOT BE FORCED INTO FUEL JACKET WITH GREATER PRESSURE THAN IS ~~NECESSARY~~ FOR FILLING JACKET TO OVERFLOW.

12. Allow fuel jacket to fill and overflow for 30-60 seconds.
13. Close solvent flow reel -2- valve.
14. Turn LO₂ dome purge off.
15. Remove the four drain screws from B-1 thrust chamber and allow solvent to drain.
16. Adjust service unit high pressure loader so that the high pressure purge gage reads 450 psig.
17. Turn selector to reel -2-.
18. Set nitrogen high pressure timer for 3 minutes.
19. Turn LO₂ dome purge on, reel -1-.
20. Turn timer switch ~~to on~~. Purge comes on, continues for 3 minutes, and then shuts off automatically.
21. Turn LO₂ dome purge off.
22. Disconnect service unit reel -1- from LO₂ dome flush purge port.
23. Disconnect service unit reel -2- hose from fuel jacket flush-purge port and cap port.

INSP.

V. (Cont'd)

24. Connect service unit reel -2- hose to LO_2 dome flush and purge port.
25. Set low pressure loader so that solvent tank pressure gage reads 175 psig.
26. Open solvent flow reel-2- valve and flush oxidizer dome for 30-60 seconds.
27. Close solvent flow reel -2- valve.
28. Turn service unit timer switch to reset and then to normal. Purge comes on, continues for 3 minutes, and then shuts off automatically.
29. Remove service unit reel -2- hose from oxidizer dome flush-purge connector, and reconnect missile oxidizer purge system.
30. Connect igniter fuel and gas generator fuel bootstrap lines and remove cap from main oxidizer duct and replace oxidizer flow regulator for B-1 engine.
31. Replace drain screws at exit end of B-1 thrust chamber.
32. Repeat steps 4 thru 31 (of Paragraph B) for B-2 engine.
33. Replace drain screws at exit end of Sustainer thrust chamber.
34. Connect service unit reel-2-hose with adapter to sustainer fuel jacket flush-purge connector on the downstream side of propellant utilization valve.
35. Check the solvent tank pressure bleed valve is closed.
36. Turn solvent tank pressurization valve to on.
37. Disconnect sustainer oxidizer dome missile purge system at the sustainer connect point and connect service unit hose -1- to the engine oxidizer dome flush-purge port.
38. Turn oxidizer dome purge on; reel -1-.
39. Open solvent flow reel -2- valve.

INSP.

V. (Cont'd)

40. Open low pressure leader slowly until solvent begins flowing into jacket.

CAUTION

THE SOLVENT SHOULD NOT BE FORCED INTO FUEL JACKET WITH GREATER PRESSURE THAN IS NECESSARY FOR FILLING JACKET TO OVERFLOW.

41. Allow fuel jacket to fill and overflow for 30-60 seconds.
42. Close solvent flow reel -2- valve.
43. Turn off oxidizer dome purge.
44. Remove the four drain screws from thrust chamber exit and allow solvent to drain.
45. Adjust service unit high pressure leader so that pressure high purge gage reads 450 psig.
46. Turn selector to reel -2-.
47. Set nitrogen high pressure timer for 3 minutes.
48. Turn oxidizer dome purge on; reel -1-.
49. Turn timer switch to normal. Purge comes on, continues for 3 minutes, then shuts off automatically.
50. Turn oxidizer dome purge off.
51. Remove reel -2- from sustainer fuel jacket flush-purge port and cap port.
52. Remove reel -1- from oxidizer dome flush-purge port and connect reel -2- to this port.
53. Set low pressure leader so that solvent tank pressure gage reads 175 psig.
54. Open solvent flow reel -2- valve and flush oxidizer dome for 30-60 seconds.
55. Close solvent flow reel -2- valve.

V. (Cont'd)

INSP.

56. Turn service unit timer switch to reset and then to normal. Purge comes on, continues for 3 minutes, and then shuts off automatically.
57. Remove service unit reel -2- hose from oxidizer dome and reconnect oxidizer purge system.
58. Replace four drain screws in exit end of thrust chamber.
59. Connect igniter fuel line, fuel manifold pressure sensing line, and the H.S. servo oxidizer sensing line at the sustainer thrust chamber.
60. Secure engine service unit.

NOTE

THE BOOSTER AND SUSTAINER TURBOPUMP GEAR CASES MUST BE FLUSHED WITH PRESERVATIVE OIL IF NO HOT FIRING IS SCHEDULED FOR THE NEXT TEN DAYS, OR WITHIN TEN DAYS AFTER ROTATION OF THE TURBOPUMPS BY OTHER THAN MANUAL MEANS. SEE ATP-P-0051, TURBOPUMP GEAR CASE PRESERVATION, FOR CORRECT PROCEDURE.

VI. SHUTDOWN

1. Replace all engine covers and all drain and vent humidity plugs.
2. Make a thorough inspection of the boosters, sustainer and vernier engines for evidence of discrepancies or failures.